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10/761,191	01/22/2004	Hiroshi Haraguchi	2018-836	2332

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ARLINGTON, VA 22203

EXAMINER
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VATHYAM, SUREKHA

ART UNIT	PAPER NUMBER
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1753

MAIL DATE	DELIVERY MODE
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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/761,191

Applicant(s)

HARAGUCHI ET AL.

Examiner

Surekha Vathyam

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 22 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 January 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>1/22/04, 9/21/06 &amp; 9/28/06</u> .                          | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement (IDS) submitted on 28 September 2006 was considered as a substitute for the IDS submitted on 21 September 2006. All references in the IDS filed on 28 September 2006 have been considered. Some references have been crossed off on the IDS submitted on 21 September 2006 solely to avoid duplication and eliminate the erroneous entry. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

### ***Drawings***

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: "181" in fig. 2B. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the

examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

3. The disclosure is objected to because of the following informalities:

Page 7, line 10, the abbreviation "EGR" is used without any explanation.

Page 7, line 23, the abbreviation "ECU" is used without any explanation.

Page 9, line 5, "101" should be changed to - -104 - -.

Page 13, line 9, "is in active" should be changed to - -is active - -.

Page 16, line 8, "106a" should be changed to - -106b - -.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1 – 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Particularly the portion of claim 1 that recites "a gas inlet hole" in lines 12 – 13 and in lines 14 – 15 further describes the gas inlet hole as including "a plurality of side wall holes and at least one bottom wall hole" which contradicts "a" hole, is unclear. For purposes of examination, the claim will be interpreted to recite "a gas inlet hole assembly" including a plurality of holes.

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6. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 6 recites the limitation " the outer side wall holes of the outer cover " and "the outer bottom of the outer cover" in lines 1 – 3 of the claim. There is insufficient antecedent basis for this limitation in the claim.

7. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 8, lines 2 – 3 recite, "the outer cover has an outer gas inlet hole including a plurality of outer side wall holes" which has the contradiction of one hole including a plurality of holes, making the claim unclear. For purposes of examination, the claim will be construed to recite, "the outer cover has an outer gas inlet hole assembly including a plurality of outer side wall holes".

8. Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 9, lines 2 – 3 recite, "the outer cover has an outer gas inlet hole including a plurality of outer side wall holes" which has the contradiction of one hole including a plurality of holes, making the claim unclear. For purposes of examination, the claim will be construed to recite, "the outer cover has an outer gas inlet hole assembly including a plurality of outer side wall holes".

***Claim Rejections - 35 USC § 103***

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9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 1 – 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato et al. (US 6,348,141) in view of Makino et al. (US 6,346,179).

Regarding claim 1, Kato ('141) discloses a gas concentration detector provided in a space for measuring a concentration of given gas contained in measurement gasses existing within the space (column 1, lines 5 – 10), the gas concentration detector comprising: a sensor element (12) including, a sensor cell (74, 90) for detecting the concentration of the given gas contained in the measurement gasses that are admitted into a chamber within the sensor element (column 10, line 54 – column 11, line 20 and column 11, line 46 – column 12, line 13), and a monitor cell (50, 66) for detecting an O<sub>2</sub> concentration within the chamber (column 6, lines 21 – 46 and column 7, lines 30 – 54); and an element cover (100) that is a cylinder having a bottom (column 12, lines 22 – 23), to surround the sensor element (column 12, lines 15 – 22), wherein the element cover has a gas inlet hole assembly (see figs. 1, 5, 6, 7, 9, 11, 12, 15) through which the measurement gasses flow, wherein the gas inlet hole assembly includes a plurality of side wall holes(106) (column 12, lines 24 – 27) and at least one bottom wall hole (108) wherein diameter of the side wall holes are within a range between 0.5 and 1.5 mm (column 13, lines 40 – 42), and wherein a ratio of the diameter of the side wall holes to the diameter of the bottom wall hole is within a range between 0.5 and 1.5 (column 13, lines 40 – 49).

Kato ('141) does not explicitly disclose the diameter of the bottom wall hole is within a range between 0.5 and 1.5 mm. Kato ('141) however discloses a diameter of about 2.0 mm for the bottom hole.

Makino ('179) teaches a gas concentration detector (column 1, lines 6 – 8) comprising: a sensor element (2) and an element cover (6b) that is a cylinder having a

bottom, to surround the sensor element (column 7, lines 51 – 54), wherein the element cover has a gas inlet hole assembly (see figs. 3 – 8) through which the measurement gasses flow, wherein the gas inlet hole assembly includes a plurality of side wall holes (60, 61) and at least one bottom wall hole (62), wherein diameters of the side wall holes ( $D_7$ ) and the bottom wall hole ( $D_5$ ) are within a range between 0.5 and 1.5 mm (column 10, lines 13 – 17 and lines 25 – 31), and wherein a ratio of the diameter of the side wall holes to the diameter of the bottom wall hole is within a range between 0.5 and 1.5 (column 10, lines 13 – 17 and lines 25 – 31).

It would have been obvious to one of ordinary skill in the art to modify the gas sensor of Kato ('141) to have the diameter of the bottom wall hole be within a range between 0.5 and 1.5 mm as taught by Makino ('179) because as Makino ('179) explains, the diameter of the various holes in the gas inlet hole assembly are optimally chosen to not impede the flow of gas into or out of the holes which in turn improves the detection response of the gas concentration detector (column 10, lines 13 – 17 and lines 25 – 31).

Regarding claim 2, while it is unclear if “the given gas” is a required element of the claim, nonetheless Kato ('141) discloses the gas concentration detector wherein the given gas includes NO<sub>x</sub> (column 4, lines 55 – 61), and wherein the sensor cell (74, 90) includes an electrode (70, 92) that faces the chamber (see figs. 3 and 4) and that is active in decomposing the NO<sub>x</sub> (column 8, lines 23 – 28) while the monitor cell (50, 66) includes an electrode (40, 60) that faces the chamber and that is inactive in



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decomposing the NO<sub>x</sub> (column 6, line 61 – column 7, line 10 and column 9, line 61 – column 10, line 12).

Regarding claim 3, Kato ('141) discloses the gas concentration detector wherein the plurality of the side wall holes includes four, five, or six side wall holes (column 13, lines 40 – 46).

Regarding claim 4, Kato ('141) discloses the gas concentration detector wherein all of the plurality of the side wall holes are disposed approximately in a same virtual plane perpendicular to an axis of the cylinder (see figs. 9 and 7 and column 13, lines 40 – 46).

Regarding claim 5, Kato ('141) discloses the gas concentration detector further comprising: an outer cover (102) surrounding the element cover (100) to form a double structured cover by being combined with the element cover (see figs. 1, 5, 6, 7, 9, 11, 12, 15).

Regarding claim 6, Kato ('141) discloses the gas concentration detector wherein the outer side wall holes (110) of the outer cover are disposed closer to the bottom of the element cover and the outer bottom of the outer cover than the side wall holes (106) of the element cover (see figs. 1, 5, 6, 7, 9, 11, 15).

Regarding claim 7, Kato ('141) discloses the gas concentration detector wherein the outer cover (102) has an outer gas inlet hole including at least one outer bottom wall hole (140). Kato ('141) does not explicitly disclose the diameter of the outer bottom wall hole.

Makino ('179) teaches a gas concentration detector wherein an outer cover (6a) has an outer gas inlet hole (see figs 3(a), 4(a)) including at least one outer bottom wall hole (64), and wherein a diameter ( $D_4$ ) of the outer bottom wall hole of the outer cover is not less than the diameter of the bottom wall hole ( $D_5$ ) of the element cover (column 10, lines 9 – 12).

Regarding claim 8, Kato ('141) discloses the gas concentration detector wherein the outer cover (102) has an outer gas inlet hole assembly including a plurality of outer side wall holes (110), and wherein diameters ( $d_1$ ) of the outer side wall holes of the outer cover (column 13, lines 28 – 32) are not less than the diameters ( $d_2$ ) of the side wall holes (106) of the element cover (100) (column 13, lines 40 – 42).

Regarding claim 9, Kato ('141) discloses the gas concentration detector wherein the outer cover has an outer gas inlet hole assembly including a plurality of outer side wall holes (110) (column 13, lines 28 – 32) and at least one outer bottom wall hole (140), and wherein diameters of the outer side wall holes ( $d_1$ ) of the outer cover (column 13, lines 28 – 32) are not less than any diameters of the side wall holes ( $d_2$ ) (column 13, lines 40 – 42) and the bottom wall hole ( $d_3$ ) of the element cover (column 13, lines 47 – 49). Kato ('141) does not explicitly disclose the diameter of the outer bottom wall hole.

Makino ('179) teaches a gas concentration detector wherein an outer cover (6a) has an outer gas inlet hole assembly (see figs 3(a), 4(a)) including a plurality of outer side wall holes (63) and at least one outer bottom wall hole (64), and wherein diameters of the outer side wall holes ( $D_6$ ) and the outer bottom wall hole ( $D_4$ ) of the outer cover

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are not less than any diameters of the side wall holes ( $D_7$ ) and the bottom wall hole ( $D_5$ ) of the element cover (column 10, lines 9 – 31). Makino explains the diameter of the various holes in the gas inlet hole assembly are optimally chosen to not impede the flow of gas into or out of the holes which in turn improves the detection response of the gas concentration detector (column 10, lines 13 – 17 and lines 25 – 31).

Regarding claim 10, Kato ('141) discloses the gas concentration detector wherein the sensor element (12) further includes: a pump cell (44, 62) for adjusting the  $O_2$  concentration within the chamber by executing at least one of discharging  $O_2$  to an outside and pumping  $O_2$  from the outside (column 6, lines 10 – 19 and column 7, lines 11 – 29).

Regarding claim 11, Kato ('141) discloses the gas concentration detector wherein the concentration of the given gas is detected from an output difference between the sensor cell and the monitor cell (column 10, line 54 – column 11, line 8).

Regarding claim 12, Kato ('141) discloses the gas concentration detector wherein the sensor cell and the monitor cell are disposed close to each other within the chamber (see figs. 3 and 4).

13. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato et al. (US 6,348,141) in view of Makino et al. (US 6,346,179) as applied to claim 1 above, and further in view of Imamura et al. (US 6,554,983).

Regarding claim 13, Kato ('141) discloses the gas concentration detector wherein the sensor cell includes an electrode (70) formed of Rh (column 8, line 23 – 26) facing

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the chamber while the monitor cell includes an electrode (40, 60) formed of Pt-Au facing the chamber (column 6, line 61 – column 7, line 10 and column 9, line 65 – column 10, line 12). Kato ('141) does not expressly disclose the sensor cell including an electrode formed of Pt-Rh.

Imamura ('983) teaches a gas concentration detector (1) wherein the sensor cell electrode (21) includes Pt-Rh (column 9, lines 19 – 21).

It would have been obvious to modify the gas concentration detector of Kato ('141) in view of Makino ('179) to include a Pt-Rh sensor electrode as taught by Imamura ('983) because of it's capability of decomposing NO<sub>x</sub> into oxygen ions and nitrogen ions as explained by Imamura ('983) (column 9, lines 19 – 23).

### ***Conclusion***

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


Atsumi et al. (US 6,682,639) discloses a gas concentration detector with all the disclosed structural elements of claim 1 except for sensor element components.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Surekha Vathyam whose telephone number is 571-272-2682. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SV  
May 2, 2007

  
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